POSTER

Optimization of Microcystis aeruginosa cell disruption to enhance microcystin extraction and purification processes

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Starting Year: 2013/2014

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Abstract

Worldwide occurrence of cyanobacterium *Microcystis aeruginosa* and accumulation of its hepatotoxin microcystin (MC) have been responsible for several incidents, leading the World Health Organization to implement guideline values for this toxin in water thus boosting the demand for MC's analytical standards. Furthermore, cyanotoxins are also considered promising anticancer/antitumor drugs as well as antifungal, antialgal and insecticide agents. Consequently, the U.S. Environmental Protection Agency has introduced cyanotoxins in its list of substances to be studied as a precursor to regulatory action between 2018 and 2020.

However, because of constraints found in production and purification processes, MC availability is still limited resulting in commercial prices around of 31500 □/mg. Optimization of MC production and processing techniques is therefore needed to increase its availability and decrease the corresponding production cost.

Hence, the aim of this work is to optimize cell disruption processes, which will consequently promote a more cost-effective and efficient downstream processing.

For that purpose, cell disruption yields were assessed using: 1) High-speed mixing (Ultra-Turrax) at three different intensities (10000, 15000 and 20000 rpm) and 2) Sonication at 20 and 40 Hz with different treatment times (up to 20 min).

No direct relationship was observed between Ultra-Turrax speed and organic matter release (quantified by measuring absorbance at 254 nm) since maximum values were attained at 15000 rpm.

Results show that sonication is the most efficient disruption method and 40 Hz tests allowed higher organic matter release when compared to lower frequency and Ultra-Turrax assays (2- and 6-fold increase in released organic matter, respectively). Additionally, the introduction of a pre-treatment step (freeze-thawing cycle) before disruption processes significantly increased the efficiency of both Ultra-Turrax and sonicator by 6-fold and 4-fold, respectively.